STAT

ACCOMPLISHMENTS OF CHINA'S POWER MACHINERY INDUSTRY

In China, since 1960, the Ta-ching oil field has been exploited and the epoch-making economic change has occurred that self-supply of oil has become possible, and it seems that with this, production of diesel engines and other power machines which use oil and oil gas as fuel has suddenly begun to advance. That result has been plainly shown in such news as successful trial-manufacture of a 6,000-kilowatt gas turbine and successful trial-manufacture of an 8,820-horsepower marine diesel engine.

6,000-Kilowatt Gas Turbine

According to a New China News Agency Shanghai dispatch of 1 December, China's first gas turbine was successfully trial-manufactured recently at the Shanghai Steam Turbine Plant.

The structure of the entire gas turbine unit is well-arranged, it is centrally controlled by gauges, operation is convenient, and all economic and technical characteristics are at a quite advanced level. This gas turbine consists of three main parts - air compressor, combustion chamber, and turbine, - and with the generator and other accessory equipment, it forms one generator. As the result of continuous operational generation for a quite long period of time, it has been shown that when the unit is set in operation, the generator reaches rated output in a comparatively short period of time, sending out a great amount of electric power, and that its efficiency is good. The State Inspection Committee formed by the No. 1 Machine Industry Department, Water Utilization and Electric Power Department, and related units of Shanghai, affirmed after inspection that this unit's efficiency is good, its operation equable, its starting quick, and that it conforms to design requirements.

This gas turbine uses heavy oil or filtered fuel oil as fuel, and can use natural gas if slightly altered. This unit has no large-volume boiler as well as its accessory equipment and pipes, and a boiler room and coal yard are also unnecessary. Also, the volume of the entire unit is small and its weight light, and compared with a steam turbine powerplant of the same capacity, in construction, metal material, the powerplant building, and investment in equipment can all be reduced by about one half. Also, since this equipment has both automatic and manual control and automatic safety equipment, operational and maintenance personnel are greatly reduced.

This unit can be used in construction of movable powerplants, and since it is especially suitable for use in oil-producing areas of little water or coal, at the present time in which China's oil industry is advancing, production of this gas turbine is considered to have great significance in development of the Chinese economy. Also, since this gas turbine can generate its full load in a comparatively short period of time after being set in operation, large-sized powerplants of industrial cities can regulate loads at the proper time by setting the gas turbine in operation at times of peak electrical consumption.

Gas turbine power equipment is something new which has a history of only a little more than 20 years in the world. In China, in 1964, the Nanking Turbine Plant built China's first gas turbine for industrial use, and the capacity of this first equipment was 1,500 kilowatts. The fact that about one year after that a 6,000-kilowatt gas turbine was successfully trial-manufactured shows China's speedy technical development in this field.

In the course of trial-manufacture of the 6,000-kilowatt gas turbine, workers and technicians of the Shanghai Turbine Plant received strong assistance of more than 40 related units including the Railroad Electrical Industry Bureau of the Water Utilization and Electric Power Department, Huatung Electric Power Design Academy, Shanghai Electric Machinery Plant, and Chinghua University, and many new processing methods, new techniques, and new materials were made and used. Domestically-made materials were completely used in the construction of equipment, and it is said that even though rotors and blades which were made using domestically-produced steel material are operated at high temperatures of from 600 degrees to 700 degrees centigrade and at very low temperatures of several tens of degrees below zero, good mechanical efficiency can be maintained.

8,820-Horsepower Marine Diesel Engine

Another 1965 accomplishment of China's power machinery which should be mentioned is the successful trial-manufacture of China's first 8,820-horsepower heavy-model low-speed diesel engine at the Shanghai Hutung Shipbuilding Plant. As a result of this diesel engine's having been installed in 10,000-ton-class large-model vessels and having conducted sea navigation, it can be said to have been demonstrated that its efficiency is good, and since during the past few years in China, although construction of large-sized ships and production tech-

niques of hull construction have advanced, in marine machinery it has not been possible to produce diesel engines and they have had to be imported from foreign countries or substitute steam engines, successful trial-manufacture of this large-model marine diesel engine holds epoch-making significance for China's shipbuilding industry.

According to an 18 November dispatch of the New China News Agency, at the time workers of the Hutung Shipbuilding Plant began trial-manufacture of this machine, there was no existing technical data to refer to and also there were no machines or large factory buildings for processing large-model items. Because of that, some persons held doubts that it was possibly too soon to now construct such a large diesel engine, and some persons advocated that technical data be brought in from foreign countries. At this time, a certain capitalist firm member came on a visit for business talks and gave the terms that the price for plans was several hundreds of thousands of dollars and that subsequently, as China produced each engine, four percent of the price would be paid, and even if none should be produced, several tens of thousands of dollars would be paid each year. Workers and technicians of the shipbuilding plant, hearing of these severe terms, are said to have bestirred themselves to try to contruct this large-model diesel engine by their own efforts.

Before setting about manufacture of the entire machine and with the objective of gaining experience, they first built a single-cylinder experimental machine. In this construction process many experiments were advanced and much data came to them, and from this, basic data was obtained. It is said that many experiments failed, but they were started again several times, and with repeated experiments, the various parts were improved each time.

In the process of construction, the method of the three consolidations of management, workers, and technicians was adopted at this shipyard, and many combined native and foreign machine tools were newly made, and equipment necessary for processing large-model parts of a weight of more than 50 toms was manufactured by their own effort. At the same time, technical innovations and technical revolutions reaching several thousand items were realized in the entire plant, and not only were construction problems of the large-model diesel engine solved, but production efficiency was increased and technical experience was gained.

Also, in construction of this diesel engine, the plant, university, and research institute joined together, and the three items of design, construction, and use, were unitedly advanced. Such units as Shanghai Chiaotung University, Ship Design Academy, Hsinhua Power Machinery Plant, Shanghai Ship Plant, and the Hutung Shipbuilding Plant jointly formed design groups and conducted on-the-spot designing. More than 200 units of the entire country also provided special materials for construction of this important product, solved experimental and research problems, and accomplished processing tasks.

A 2,200-horsepower marine diesel engine was also manufactured in Shanghai last year. In order to limit weight to nine tons, the latest techniques of welded steel plate structure and supercharging were combined.

New-Type Combustion Chamber Designed in Tientsin

According to a 24 October New China News Agency dispatch, a new-type of high-efficiency combustion chamber, which is the most important part of a diesel engine, was designed at the Tientsin Internal Combustion Research Institute, and it is considered that this new accomplishment will make a great contribution to further development of China's internal combustion engine industry.

This internal combustion chamber is called a "compound type" and has "air injection" and "solid injection." This is the direct result of diligent research continued for the past several years by the Tientsin Internal Combustion Research Institute concerning increase of combustion efficiency. According to results of experiments, this type of 10-horsepower diesel engine can put out 13 to 14 horsepower of power, and fuel consumption is lower than other types of diesel engines which China has produced previously.

In this "compound type" combustion chamber, part of the fuel is consumed by "air injection" and part is consumed by "solid injection," and the proportion can be adjusted. Since the good points of both the old fuel jet method and the new jet method have been adopted and combined, starting of this new engine is easy, it does not give off noise or smoke, and its vibration is at a minimum. Various fuels such as diesel oil, petroleum, and kerosene can be used.

Recent Situation of Diesel Engine Plants

The above are China's latest accomplishments in advanced, large-model power machine production, and in addition to this, production of small-model power machines for the purpose of advancing water drainage and irrigation in agricultural villages, agricultural machines, and mechanization of processing of agricultural products, can be said to have truly been advanced with great horsepower. In internal combustion engines, aside from coal gas engines, diesel engines, and gasoline engines, such things as free-piston gas diesel engines and exhaust intensified diesel engines have been produced. According to a 12 October 1964 dispatch of the Chungkuo Hsinwen, it is said that in power for agricultural use, several tens of kinds of power machines were produced in 1964, and that if production capacity is calculated in horsepower, it has increased to more than six times that of the First Five-Year Plan (1953-1957).

Below, we will briefly list the present status of principal diesel engine manufacturing plants as recently reported.

Shanghai Diesel Engine Plant

In less than two years after 1958, more than 600 pieces of specialized equipment were manufactured and 7 automatic and semiautomatic production lines were constructed. Also, the model 135 Tung-feng-pei diesel engine which is of Chinese design and was successfully produced by technical efforts within the plant is of excellent quality

and all of its materials are domestically produced. In 1965, the production task of the model 135 Tung-feng-pei diesel engine which is the plant's principal product was increased 33 percent from the previous year and fuel nozzles were increased 39 percent, and for the purpose of realizing this production task, 1,272 technical innovations were realized in the first quarter of the year alone, and every month the production plan was exceeded. Also, the plant is being expanded, and in the 1 April 1965 issue of Jenmin Jihpao, an article by Kao Tso-kung, who is the responsible designer of the No. 2 Design Section of the No. 1 Machine Industry Department which designed the expansion work of the plant, was published, and according to that it was stipulated in the expansion design assignment that investment would be 19,000,000 yuan (2,850,000,000 yen), but as a result of the design it came to 35,850,000 yuan. However, there was waste in that design, and as a result of checking and revision, it is said that 14,020,000 yuan of investment was saved.

Wuhan Power Machinery Plant

Diesel engines previously used in China have been of the water-cooled type, but this plant successfully trial-manufactured an air-cooled-type diesel engine designed by China's own efforts (New China News Agency, 21 September 1965). This 20-horsepower air-cooled diesel engine passed a 1,500-hour endurance test, and it was affirmed to be far superior to the same kind of water-cooled diesel engine model, and the weight and the amount of copper used are less than the water-cooled type.

Hupeh Diesel Engine Plant

This plant is one of five quite large-scale plants in Wuhan which manufacture electric motors, diesel engines, and gas engines of more than 100 horsepower. Since manufacturing its very first engine in 1953, this plant has supplied 50 percent of the diesel engines used in farming villages of Hupeh Province, and its 1963 production exceeded 20,000 horsepower.

Wuhan Diesel Engine Plant

Two years ago this plant could only do "rough work" such as cotton gins, but in 1965 it began production of diesel engines installed in Wuhan-made "industrial-agricultural model 7" hand tractors. This plant has had the task of making diesel engines for four years, but the technical base of the plant was comparatively weak and it did not have first-class precision machine tools necessary for manufacturing diesel engines. In this regard, workers were given technical instruction, technicians came, a technical innovation movement was expanded, and production of equipment by their own efforts was undertaken, and in a mere three or four months, blueprints were drawn up for more than 100 specialized facilities necessary for production of diesel

engines, and high-precision, high-efficiency facilities including such things as diamond boring machines, revolving-table milling machines, and fluid-pressure profile lathes were designed and trial-manufactured and it became possible to produce diesel engines, and it is said that about one out of two of the machine tools used in the plant's production are either made by the workers or rebuilt by them, and they have high repute in the Wuhan machine industry community.

Dairen Diesel Engine Plant

The 2-10 model 20-horsepower marine diesel engine is formally produced and supplied to fishermen. This special-design diesel engine, after being used experimentally for one year by fishermen of the two districts of Chou-shan and Lu-ta, formally entered production, and the size of the engine is small, its weight light, and starting and operation are comparatively easy, and at the same time, vibration is slight, oil is economized, and it is suitable for powering small-model fishing boats. When this diesel engine and related equipment are installed in fishing vessels of 15-ton carrying capacity going out fishing in ordinary weather, seven to eight nautial miles per hour can be traveled, and even when fully loaded, they can travel four to five nautical miles per hour. When a starting electric motor is attached to the diesel engine, fast starting is assured even in times of emergency of encountering rainstorms and at temperatures of less than 10 degrees centigrade. When a pulley and small-sized generator are attached to the diesel engine, the net-winder can be operated with the generated electricity, and at night it can be used for illumination.

Kiangsu Province Changchou Diesel Engine Plant

The model 195B diesel engine is produced, and aside from being used for powering hand tractors (power of "industrial-agricultural model 7" is model 195), it is mostly used for powering drainage and irrigation of farm villages and processing of agricultural by-products. In March of last year, after receiving a letter from a certain commune in Hukou Hsien in Kiangsu Province saying that the cone rod of the model 195B diesel engine made by the plant had broken and could not be used, an overall examination of the quality of the product was made and production processing methods changed, and by the end of July more than 600 technical innovations were made, and the qualifying rate of the July diesel engines was raised to 98.9 percent from 90.5 percent at the end of the previous year, and the qualifying rate of principal parts was increased to 99.9 percent from 94 percent at the beginning of 1965.

Shanghai Chengfu Power Machine Plant

The "model 195-1" diesel engine is produced, and coming to grips with problems inherent in this engine, they recently designed by their own efforts the "model 195-2" diesel engine which is suited to the needs of China's farm villages and is also economical and rational. This

diesel engine, as compared with the old product, has from two to six more horsepower, its weight is 40 kilograms less, and its structure is simple.

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